

## COMPUTER SCIENCE I

*Computer Science I* introduces the structured techniques necessary for efficient solution of business-related computer programming logic problems and coding solutions into a high-level language. The fundamental concepts of programming are provided through explanations and effects of commands and hands-on utilization of lab equipment to produce correct and accurate outputs. Topics include program flowcharting, pseudo coding, and hierarchy charts as a means of solving problems. The course covers creating file layouts, print charts, program narratives, user documentation and system flowcharts for business problems; algorithm development and review, flowcharting, input/output techniques, looping, modules, selection structures, file handling, and control breaks and offers students an opportunity to apply skills in a laboratory environment.

- DOE Code: 4801
- Recommended Grade Level: Grade 10-12
- Required Prerequisite: Introduction to Computer Science
- Credits: 2 semester course, 2 semesters required, 1 credit per semester, maximum of 2 credits
- Counts as a Directed Elective or Elective for all diplomas

### Dual Credit

This course provides the opportunity for dual credit for students who meet postsecondary requirements for earning dual credit and successfully complete the dual credit requirements of this course.

### Application of Content and Multiple Hour Offerings

Intensive laboratory applications are a component of this course and may be either school based or work based or a combination of the two. Work-based learning experiences should be in a closely related industry setting. Instructors shall have a standards-based training plan for students participating in work-based learning experiences. When a course is offered for multiple hours per semester, the amount of laboratory application or work-based learning needs to be increased proportionally.

### Career and Technical Student Organizations (CTSOs)

Career and Technical Student Organizations are considered a powerful instructional tool when integrated into Career and Technical Education programs. They enhance the knowledge and skills students learn in a course by allowing a student to participate in a unique program of career and leadership development. Students should be encouraged to participate in Business Professional of America, DECA, or Future Business Leaders of America, the CTSOs for this area.

## Content Standards

### Domain – Problem Analysis

**Core Standard 1** Students analyze a problem and develop a solution by creating a computer program.

#### Standards

- CS1-1.1 Identify how to use a computer program to solve a problem
- CS1-1.2 Construct interactive computer programs that accept various forms of input and produce various forms of output, as a solution to a computer programming problem
- CS1-1.3 Use print charts, file layouts, program narratives, hierarchy charts, and system flowcharts, which accurately depict the problem assigned and describe the solution
- CS1-1.4 Report the program schematics and usage

- CS1-1.5 Identify the standard program flowchart symbols and use them correctly within the context of the basic control structures of sequence, selection and looping

#### **Domain – Software Tools**

**Core Standard 2** Students apply and adapt software tools to develop a computer program.

##### **Standards**

- CS1-2.1 Construct a program that processes information
- CS1-2.2 Identify programming languages as procedural or object oriented
- CS1-2.3 Develop programs using reusable modules (modularization)
- CS1-2.4 Use debugging techniques to correct and validate the computer program
- CS1-2.5 Construct the program in a high-level programming language based on a created design
- CS1-2.6 Construct a program that opens and closes a file

#### **Domain – Algorithm**

**Core Standard 3** Students design a solution to the problem using algorithms.

##### **Standards**

- CS1-3.1 Develop algorithms to solve a computer programming problem(s)
- CS1-3.2 Assess the use of algorithms to provide a solution to a programming problem
- CS1-3.3 Use pseudo code to describe a solution to a programming problem
- CS1-3.4 Create a program flowchart and ANSI standard flowcharting symbols to define a solution to a programming problem
- CS1-3.5 Explain how the algorithm can be used to solve a problem

#### **Domain – Program Development**

**Core Standard 4** Students create a functional computer program.

##### **Standards**

- CS1-4.1 Define the process of programming.
- CS1-4.2 Create a computer program that corresponds to an algorithm or proposed solution
- CS1-4.3 Define programming structures
- CS1-4.4 Recognize data variables and constants
- CS1-4.5 Recognize local scope and global scope
- CS1-4.6 Use conditionals (IF statements)
- CS1-4.7 Use loops (while statements, for statements)
- CS1-4.8 Define single and multidimensional Arrays
- CS1-4.9 Use functions and methods to break down the program logic and support reuse
- CS1-4.10 Define the graphical user interface
- CS1-4.11 Identify the parts of the programming platform
- CS1-4.12 Identify different types of errors and handle them programmatically
- CS1-4.13 Use the order of operations when using calculations

#### **Domain – Program Verification and Debugging**

**Core Standard 5** Students prove a computer program solution works by using verification and debugging techniques.

##### **Standards**

- CS1-5.1 Predict and explain output
- CS1-5.2 Identify cause/effect for input/output
- CS1-5.3 Perform input validation
- CS1-5.4 Scrutinize peers code for errors

**Domain – Documentation**

**Core Standard 6** Students connect an associated task with the code by providing documentation.

- CS1-6.1 Describe the function of a computer program
- CS1-6.2 Identify the purposes of a computer program
- CS1-6.3 Explain concepts related to a computer program
- CS1-6.4 Describe how to use a computer program
- CS1-6.5 Identify cause/effect by explaining input and output
- CS1-6.6 Interpret input/output